

What is claimed is:

1. A protected aluminum mass, comprising:
a bare aluminum mass; and,
an attached layer to the surface of the bare aluminum mass comprising at least one
5 carbon atom.
2. The protected aluminum mass of claim 1, wherein the attached layer comprises a
moiety selected from the group consisting of carboxylic acid derivative, alcohol
derivative, thiol derivative, aldehyde derivative, amide derivative and combinations
10 thereof.
3. The protected aluminum mass of claim 2, wherein the moiety comprises a carboxylic
acid derivative.
- 15 4. The protected aluminum mass of claim 1, wherein the aluminum mass comprises
micron-size aluminum particles.
5. The protected aluminum mass of claim 1, wherein the aluminum mass comprises
nano-size aluminum particles.

6. The protected aluminum mass of claim 1, wherein the attached layer comprises a monolayer.
- 5 7. The protected aluminum mass of claim 6, wherein the attached monolayer comprises a moiety of a carboxylic acid derivative.
8. The protected aluminum mass of claim 1, wherein the attached layer comprises from about 3 carbon atoms to about 20 carbon atoms.
- 10 9. The protected aluminum mass of claim 8, wherein the attached layer comprises from about 9 to about 12 carbon atoms.
10. The protected aluminum mass of claim 3, wherein the carboxylic acid derivative moiety comprises a perfluoroalkyl carboxylic acid.
- 15 11. The protected aluminum mass of claim 10, wherein the perfluoroalkyl carboxylic acid is selected from the group consisting of $C_5F_9O_2H$, $C_9F_{17}O_2H$, $C_{10}F_{19}O_2H$ and $C_{14}F_{27}O_2H$.

12. The protected aluminum mass of claim 11, wherein the perfluoroalkyl carboxylic acid comprises $C_{14}F_{27}O_2H$.
- 5 13. The protected aluminum mass of claim 1, wherein the attached layer is present in a mass amount of from about 5:1 or less of aluminum to layer.
14. The protected aluminum mass of claim 1, wherein the attached layer comprises from about 85 weight percent or less of the total protected aluminum mass.
- 10 15. The protected aluminum mass of claim 1, wherein the attached layer includes at least one functional group.
16. The protected aluminum mass of claim 1, wherein the attached layer includes an energetic moiety.
- 15 17. An energetic material comprising the protected aluminum mass of claim 1.
18. A process for forming a protected aluminum mass, comprising the steps of:

forming an unprotected aluminum mass; and,

adding a layer forming reactant, wherein the layer forming reactant binds to the surface of the aluminum mass as an attached protective layer.

- 5 19. The process of claim 18, wherein the aluminum composition comprises $\text{AlH}_3 \cdot \text{NR}_1\text{R}_2\text{R}_3$, wherein R_1 , R_2 and R_3 are independently selected from hydrogen or an alkyl having from about 0 to about 10 carbon atoms, optionally in combination with one or more heterocycles.
- 10 20. The protected aluminum mass produced by the process of claim 18.